

## TRAINING STANDARD GUIDE

### ATTACHMENT 2

#### 1.0 GENERAL

1.1 HISTORY: Historically the NFPO has been an organization that has depended upon employees who possess a very unique skill set rarely seen in any aviation related workforce. This skill-set has not changed to any significant degree over the years. What has changed has been the migration to more sophisticated means of navigation due to monumental changes in equipment accuracy and reliability both on the ground and in the air. Consequently, the realm of instrument procedure development is evolving just as rapidly. The number of instrument procedures developed and maintained continues to grow at the same rate. Criteria are also evolving from a ground-based system to a more sophisticated space-based global navigation system at a staggering rate. Each year new, more accurate systems seem to appear on the horizon. In the past, the NFPO has been able to implement these criteria changes and has been able to effect the needed changes by simply briefing the new changes to the workforce. With criteria and equipment changing this quickly it takes a more formalized method of providing the information required by the employees. In addition to formal training on changes in criteria, other items such as how IAPA, APTS, IFP, and now IPDS will handle the change, how the new information will be documented and depicted graphically should also be addressed. Employee job aids and sample forms need to be developed and disseminated thus ensuring standardization.

1.2 BACKGROUND: As directed by the Director of Aviation System Standards, the Manager of the National Flight Procedures Office is responsible for NFPO training. All persons involved in NFPO training as described herein shall comply with order JW-32 3330.2. The Assistant Manager, Quality Oversight and Technical Advisory Team, is delegated authority in all matters related to the training programs and policies described in the above order. Requests for waivers to programs and policies contained in the order must receive prior approval through written requests to the Quality Oversight and Technical Advisory Team. If a conflict arises between the contents of this order and other FAA issuances, individuals shall request clarification from the Quality Oversight and Technical Advisory Team through their Procedure Team Managers. The Managers should request any needed clarification from the Quality Oversight and Technical Advisory Team. The NFPO, Production Procedure Team Managers are delegated authority in all matters involving performance verification and individual certification as related to NFPO Initial Qualification Training. The Assistant Manager, Quality Oversight and Technical Advisory Team is responsible for course content/curriculum review and oversight for all NFPO training overseen by, conducted at, or designed and developed by, the NFPO.

1.3 ORGANIZATION: The Training organization described in JW-32 3330.2 represents an alteration in organizational structure from what was previously approved. The Quality Oversight and Technical Advisory Team will report to the Assistant Manager. Within the training team will reside several Training Specialist/Subject Matter Experts. Their specific duties and responsibilities are described in Section 1-3 of the order. This new organization is responsible for designing, developing, delivering and evaluating in-house training; and is also be responsible for the review, auditing and evaluation of training provided by outside organizations. They are also responsible for

maintaining the currency and accuracy of all in-house developed training. The training section is also required to evaluate training courses available which might suffice for certain required training. For example, if there is an FAA course being conducted at the Aeronautical Center that technically fulfills our training requirements, the training section would notify the Training Coordinator who would in turn obtain quotas and fill slots commensurate with the fiscal resources available. Likewise, if there are CBI lessons available either on-line or which may be ordered, the training team may initiate the acquisition of that training for use within the NFPO. The FAA Academy is our primary provider of basic Terminal Instrument Procedures (TERPs) training. The training team is responsible for ensuring that course completion information is entered into the personnel records system and any Procedure Development Specialists Certificates are issued as required. The training team acts as the liaison for any international training initiatives or requirements that might arise, including the provision of international PAN-OPS training for NFPO specialists.

1.4 POLICY: The NFPO Training and Certification Program is administered to ensure that the selection of employees for training is made without regard to race, color, religion, sex, national origin, age, disability, or other factors unrelated to the need for learning. These procedures also guard against the use of facilities that restrict access because of disabling condition or discriminate on the basis of the above criteria. The NFPO Training and Certification Program is designed and intended to:

- a. Orient employees to the federal service, their agencies and organizational assignments, and conditions of employment.
- b. Guide new employees to effective performance during their probationary period.
- c. Provide knowledge and skills to improve job performance.
- d. Prepare employees with demonstrated potential for increased responsibility in meeting future staffing requirements.
- e. Provide continuing professional and technical training to avoid knowledge/skill obsolescence (e.g., keeping the skills of procedure specialist current).
- f. Implement reorganizations, changing missions, and administration initiatives.
- g. Develop the managerial workforce focusing on competencies identified as essential to effective performance at supervisory, managerial, and executive levels (e.g., communications, interpersonal skills, financial management, planning, evaluation, and vision).
- h. Provide education leading to an academic degree if necessary to assist in the recruitment or retention of employees in occupations within which there are present or anticipated shortages of qualified personnel, especially in those areas requiring critical skills.
- i. Provide for the career transition, training, and/or retraining of employees displaced by downsizing and restructuring.

1.5 SERVICES: Provide the services, as referenced below, in accordance with the Performance Work Statement (PWS), for the FAA IPDS Initial Qualification Training.

## 2.0 GENERAL TRAINING REQUIREMENTS

- a. All instruction must comply with the contractor's existing training program that has been approved by the FAA under Order JW-32 3330.2. The contractor is expected to exercise its best training efforts.
- b. The Initial Qualification Training shall be presented by a qualified instructor(s) in a classroom environment.
- c. The contractor shall provide all training necessary to enable the FAA students to pass the appropriate practical test or attain proficiency as applicable.
- d. The contractor shall notify the NFPO Quality Assurance and Technical Advisory Team of the FAA student's completion status within 5 working days after completion of the training program.
- e. Upon completion of all training, the contractor shall issue a Certificate of Training that certifies the type of training provided, specific dates, and the duration of such training. The certificate shall conform to FAA branding guidelines. One copy of each such certificate shall be submitted to the NFPO Quality Assurance and Technical Advisory Team.
- f. The contractor shall furnish all training aids/facilities that meet the following minimum requirements:
  - (1) Sufficient chalkboards or blackboards for effective teaching shall be provided.
  - (2) All training aids, including any audio-visuals, mockups, charts or aircraft components listed in the approved training course outline must be accurate and appropriate to the course for which they are used.
  - (3) The classroom shall be well lighted.
  - (4) Students shall be seated at suitable tables that provide sufficient space for writing and accomplishing assigned tasks.
  - (5) The classroom shall be kept clean.
  - (6) Sanitary rest-room facilities shall be available within convenient distance of the classroom.
  - (7) The classroom facilities shall be adequately ventilated, heated in winter, and cooled in summer.
  - (8) Ambient noise shall be below the distraction point. The instructor's voice level shall be easily heard from any position in the classroom.
  - (9) Contractor shall comply with safety standards specified by the National Electrical Code, the National Fire Code, and the United States of American Standards Institute in conducting contract training.
  - (10) Local environmental distractions adversely affecting student learning shall be eliminated.
  - (11) A copy of the training outline, and training schedule shall be given each student at the beginning of each class.

- (12) Experienced instructors who have a thorough knowledge of the computer systems, normal operating procedures and operational techniques shall be selected. All instructors used under this contract shall be authorized by the contractor to conduct all training required.
- (15) Any and all other equipment and services necessary to provide such operational training as pertinent to enable FAA students to qualify for certification and/or proficiency checks, as required.

2.1 PRINCIPAL PLACE OF TRAINING: The NFPO Quality Assurance and Technical Advisory Team shall designate the principal place of performance where the Initial Qualification Training will be conducted. In the event this training is conducted at a location other than where the Initial Qualification Training is located, the Quality Assurance and Technical Advisory Team shall provide all necessary classroom support at these location(s).

## 2.2 TRAINING SCHEDULE

- (a) The contractor shall start the training described in this contract within 30 calendar days after receipt of either an oral or written notice from the Contracting Officer that a requirement exists for furnish such training.
- (b) Exact training dates will be by mutual agreement of both parties.
- (c) In the event of conflict, such as equipment malfunction etc. training dates will be rescheduled to other mutually agreeable dates.

2.3 TRAINING REQUIREMENTS: Within the NFPO there is a diversity of job categories that generate different training requirements. NFPO job categories can be divided into four groups for training purposes. These four groups differ in function but are similar in many respects. Aeronautical Information Specialist (AIS) comprise the majority of employees within the NFPO. However the Flight Procedures Program Evaluation Specialist in QA and Airspace Evaluation Program Specialist in the FPO run a close second. The Managers and Leads make up the last group of specialists and are at the top of the training requirements pyramid.

The training requirements for these four groups are similar. Each group requires the same basic TERPs and automation training but each needs a different set of skills to perform day to day. For example, all four groups require the same Organizational Familiarization Training and Initial Qualification Training to become certified. All groups use the knowledge and skills gained initially as a basis for more diverse job functions. All employees when they are first hired need Familiarization or Orientation Training. This training should acquaint them with the big picture of the organization and how they fit into the grand scheme. Once the new employee gets the feel for where he/she fits into the organization, they are ready to begin preparing themselves to become a fully qualified and knowledgeable member of the organization through Initial Qualification Training. Flight Procedures Program Evaluation Specialists use this information as well as other skills needed in QA. Consequently, there is a building block approach to training. As criteria changes, equipment evolves, and careers advance there will periodically be a need for Proficiency Training. Proficiency

Training could take the form of Refresher Training, Supplemental Training or Skill Enhancement Training. As the employee begins to progress up the career ladder, additional management and leadership training such as Team Building, Coaching and Mentoring, and Conflict Management, will be required. Thus a training continuum has been developed to meet the needs of NFPO employees by providing the tools to do the job initially and then progressing to more sophisticated training, as the job needs change. The training requirements then come together at the right time and right place to meet the NFPO long term, strategic goals.

- a. Identification of Training Requirements. All NFPO employees are responsible for identifying and reviewing job tasks and training requirements and identifying new training that may be needed. Those employees who identify what they feel is a valid training requirement shall:

- (1) Document the training requirement(s) in the form of a Training Proposal (TP) and forward the proposal through their Procedure Team Manager to the Quality Oversight and Technical Advisory Team for review and recommendations.
- (2) The Quality Oversight and Technical Advisory Team shall review the proposal; determine its feasibility, appropriateness, applicability, and cost effectiveness; and make appropriate recommendations as to whether it should be adopted. They may suggest appropriate alternatives when needed.
- (3) The NFPO Manager shall review the recommendations, determine the most cost effective means of delivering the training, and approve/disapprove or amend the proposal.

- b. Development of Training.

- (1) The Quality Oversight and Technical Advisory Team shall take the lead in designing, developing, delivering and/or evaluating training programs in support of identified and approved training requirements.
- (2) The Quality Oversight and Technical Advisory Team, in concert with outside organizations, shall develop course control documents (statement of objectives, course design guide, job task analyses, and student materials) in support of each course offered employees.
- (3) All training courses for NFPO use shall be designed, developed and administered in accordance with Instructional Systems Design methodology and industry best practices as outlined below.

### 3.0 PERFORMANCE WORK STATEMENT

#### 3.1 INSTRUCTIONAL SYSTEMS DESIGN (ISD)

3.1.1 COURSE DEVELOPMENT EFFORT: As can be seen in the discussion below the application of the formal ISD Process can be rather detailed and/or extensive, particularly in the Analysis and Development Phases. If not

careful the designer can expend precious resources in completing a detailed Job Task Analysis or a Media Analysis when they're not really needed. This requirement document is not intended to establish a "formal ISD Development Process". Instead, the following guidelines are meant to establish the minimum documentation required while allowing the flexibility to produce quality training products at minimum cost. In keeping with the tenants of the ISO/Quality programs, Order JW-32 3330.2 establishes the processes necessary for the NFPO Training Team to operate under ISO guidelines. The modified ISD processes expressed here will be used for determining the Level of Development Effort required in producing training materials and for documenting the thought processes used by individual course developers while designing and developing course materials for the NFPO.

a. Limited Development Effort.

- (1) Time very critical.
- (2) Requirements for training not expected to be of long duration.
- (3) Small to medium student population.
- (4) Training outcomes do not require measurable terminal behaviors.
- (5) Uniformity of training important, but exceptionally high degree not required.

b. Complete Development Effort

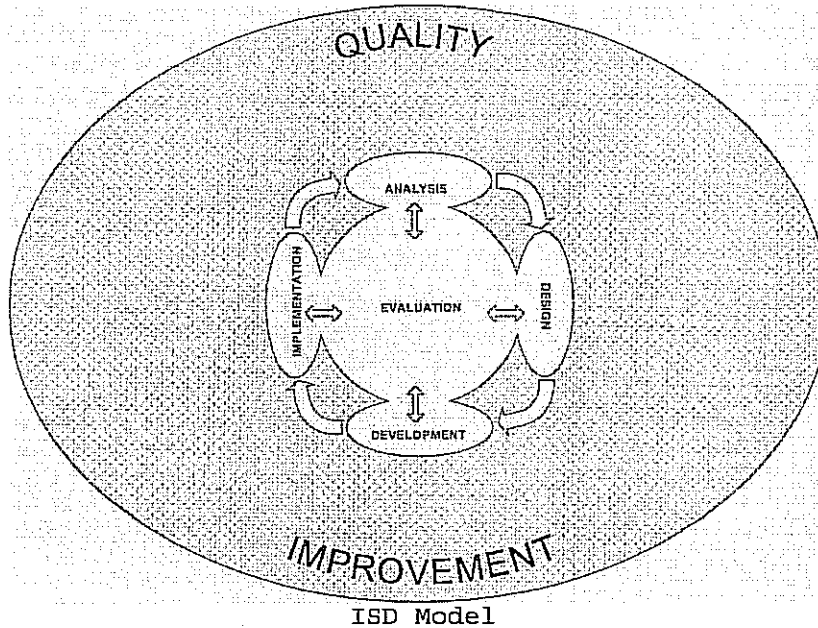
- (1) Planning cycle provides significant lead-time.
- (2) Large student population.
- (3) Expected continuing training requirement of long duration.
- (4) Mandatory training requirement.
- (5) Training outcomes are based on very specific description of terminal behaviors.
- (6) Exceptionally high degree of uniformity and quality control required of training.

The following table outlines the guidelines that set the general conditions that may apply to each type of development effort.

Development Activity	Complete	Limited
Depth of Analysis	Job and task analysis or job training standard.	Task list or inventory
Instructional Objectives	Fully descriptive explicit statement of behavior, conditions, and standards.	Only statement of behavior
Methodology	Fully consistent with behaviors described by the instructional objectives—simulation, role-playing,, laboratory exercises, etc.	Limited to lecture, group discussion, etc., (instructor-centered activities).
Performance Measures	Fully consistent with instructional objectives—live simulations, hands-on equipment tests, actual task performance, etc.	Written tests, oral questions, interactive items, etc.
Course Design	Instructional objectives, enabling objectives,	Course outline.

	classification of behaviors, methodology, learning sequence, practice activities, and performance tests.	
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3.1.2 PHASES: ISD is comprised of five phases.



The primary emphasis of a systematic approach is on the interrelationship of these phases. These phases are:

- a. Analysis
- b. Design
- c. Development
- d. Delivery (Implementation)
- e. Evaluation.

The first four phases are sequential; the output of one phase results in input to the next phase. The evaluation phase, the final phase, is an interactive process applied throughout the entire process.

Note: All of the phases should be conducted; however, various factors, such as resources, time, budget, etc., may affect the level of detail or depth at which each phase is performed.

Contents: The remainder of this chapter is divided into sections corresponding to each of the phases listed above.

#### 3.1.2.1 ANALYSIS PHASE:

- a Training Need: The primary purpose of the analysis phase is to determine if a training need exists. This is accomplished by conducting a needs assessment. If it is determined that a need for training exists, then:
- (1) Decide the best way to satisfy the need, and
  - (2) Broadly define the scope of the effort and needed resources.
- b Mandated by Directive: Sometimes courses are mandated or established by a directive. When this occurs, course content must still evolve from the ISD process.
- c Poor Job Performance: Poor job performance is another event that may initiate training. It is significant to note that training may not always be the solution for such a problem. If the poor performance is caused by lack of skills, then a job analysis should be conducted to determine the training needs.

Note: If poor performance is due to lack of or no motivation or the wrong environmental condition, training will not resolve the problem.

- d Job Requirements: The secondary purpose of the analysis phase is to collect and study information concerning the requirements of the particular job.
- e Job and Task Analysis (JTA): The JTA is one course control document produced in this phase. This course control document establishes the job requirement and identifies the knowledge's and skills that must be supported by formal training. If a current Job Task Listing exists, then any new job tasks may be simply added rather than conducting an entire Job Task Analysis. The JTA contains the following:
- (a) List of tasks, subtasks, elements, sub-elements
  - (b) Conditions, standards, and job aids
  - (c) Skills and knowledge
  - (d) Tasks to be trained
- (6) Training Proposal (TP): If the need for training has been established, the TP is the output of this phase. This course control document establishes the need for training (See JW-32 3330.2 Appendix B). The TP contains the following:
- (a) Contact information
  - (b) Description of training need
  - (c) Training requested
  - (d) Cause of training need
  - (e) Benefits and differences
  - (f) Number to train
  - (g) Completions schedule



- (h) Prerequisites
  - (i) Other pertinent factors
- (7) Training Development Plan (TDP): Typically the Quality Oversight and Technical Advisory Team responds to an approved TP with a TDP. The TDP is a work plan for the development of a course. This course control document establishes the parameters within which the course development will take place. It identifies resources, deliverables, a schedule and addresses any issues and concerns that need to be addressed (See JW-32 3330.2 Appendix C). The TDP contains:
- (a) Purpose
  - (b) Objectives
  - (c) Key personnel
  - (d) Technical approach
  - (e) Products or deliverables
  - (f) Media selection analysis
  - (g) Cost analysis
  - (h) Funding requirements
  - (i) Schedule
  - (j) Issues/Concerns
  - (k) Course Catalog Entry (if required)

#### 3.1.2.2 DESIGN PHASE:

- (1) Purpose: The purpose of the design phase is to prepare a plan for training based on the information compiled in the analysis phase. This plan guides the development of all training materials and strategies and should include:
- (a) Training outcomes and associated instructional and enabling objectives
  - (b) Instructional methods/media
  - (c) Testing activities
- (2) Course Design Guide (CDG): The output of the design phase is a CDG and/or a course schedule. This course control document takes the TDP produced earlier, and adds more precise details in the form of training outcomes and objectives, a technical course outline, a media analysis and a testing methodology. A course layout and schedule are also produced. In other words, a detailed blueprint for development is created (See JW-32 3330.2 Appendix D). The CDG is produced by:
- (a) Analyzing the training outcomes in the TDP
  - (b) Developing instructional and enabling objectives

- (c) Outlining technical content
- (d) Identifying media and training aids
- (e) Identifying instructional and testing methods
- (f) Systematically planning and structuring the training being developed.

Note: The CDG is used as a basis for the development of training materials, tests, and overall course structure.

### 3.1.2.3 DEVELOPMENT PHASE:

- (1) Purpose: The purpose of the development phase is to translate the CDG into instructional materials, to validate materials through tryouts, and to prepare a Course Report (CR) (See JW-32 3330.2 Appendix E).
- (2) Process: The development process is conducted in the following steps:
  - (a) Analyze existing instructional materials
  - (b) Develop lesson plans
  - (c) Develop instructional materials, including instructor guides, student guides, course manuals, visuals, lesson tests, and course tests as required
  - (d) Validate materials (conduct tryouts and first class)
  - (e) Revise, if needed
- (1) Course Report (CR): The formal documentation that is the output of the development phase is the course report. It provides a complete and current overall record of the course. It validates the course and certifies the course described in the TDP (See JW-32 3330.2, Appendix C) has been successfully developed and is ready for regular presentation to students. This report is submitted within 30 days after first course conduct (prototype class).

### 3.1.2.4 DELIVERY (IMPLEMENTATION) PHASE:

- (1) Purpose: The delivery phase involves the presentation of the course materials to the students.
- (2) Procedures: Presentation of material is the main part of implementation, but there are several factors which are equally important:
  - (a) Organization of presentation materials
  - (b) Management of student handouts
  - (c) Operation of training and audiovisual aids
  - (d) Administration of tests

- (e) Distribution and collection of course critiques.

#### 3.1.2.5 EVALUATION PHASE:

- (1) Purpose: The evaluation phase is used to measure how well the instructional process enables students to accomplish objectives and how training affects graduate job performance.
- (2) The evaluation phase, an ongoing phase, is an interactive process applied throughout the entire existence of the course. This continuous process is required to maintain or improve the effectiveness and efficiency of a course and to keep it up to date and current as to changes in criteria.
- (3) Benefits: The benefits of an ongoing evaluation are:
  - (a) Identifying and reducing problems with instruction
  - (b) Ensuring cost effectiveness
  - (c) Measuring transfer of learning to workplace performance
- (4) Evaluations: There are two types of evaluations:
  - (a) Formative (internal), the process used to measure how well training is being conducted in residence and how well students are able to meet the instructional objectives. Course tests and Division end-of-course evaluations (if required) are internal evaluations.
  - (b) Summative (internal), the process used to determine how well course graduates are performing on the job. Division post-course evaluations are considered internal evaluations.

#### 3.1.3 CONCLUSION:

- (1) Team Effort: The ISD process works best when a team is assigned or identified to develop training. The core members of the team are the subject matter expert(s) (SMEs), the course developer(s), and the instructional systems specialist(s) (ISSs). Other members may include training specialists, computer programmers, graphic artists, photographers, and other technical personnel with knowledge of the equipment or system or process for which training is to be developed.

Other personnel may be involved at various stages in the development or revision effort, such as the section, branch, or division manager, program office personnel, and personnel from the applicable headquarters office representing the appropriate line of business and bargaining unit representatives.

- (2) Additional Information: By following the phases of the ISD process, the Division will produce capable and competent employees.

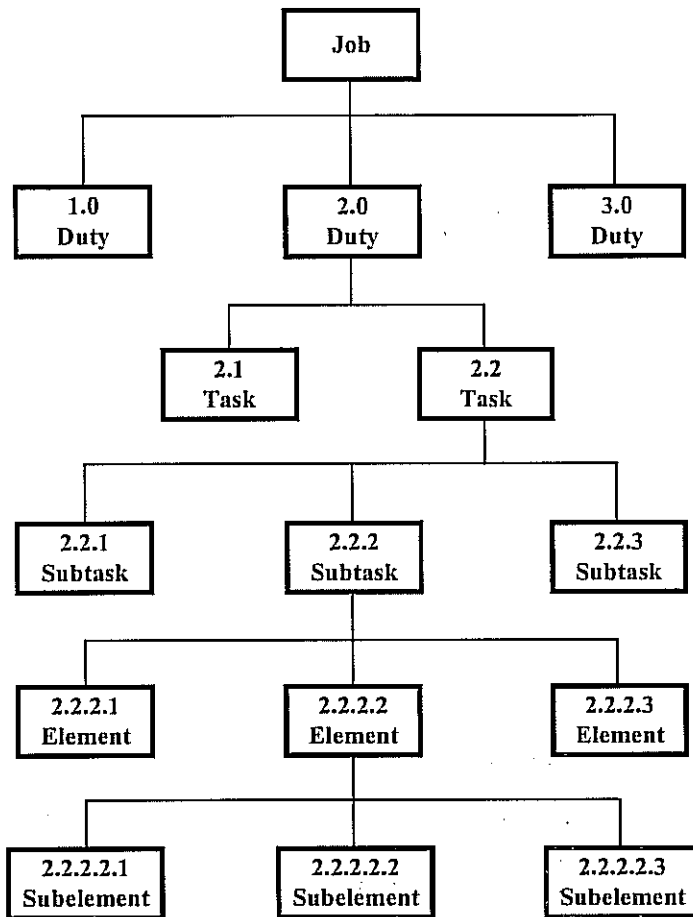
## 3.2 JOB AND TASK ANALYSIS (JTA)

### 3.2.1 HIERARCHIES:

- a. Purpose: The purpose of this section is to describe job and task analysis and the process for conducting a JTA. This process can be rather laborious, however when a JTA has been previously performed any new training must only consider any new tasks or job skill requirements. Thus only minor revisions to the JTA may be required.
- b. Description: Job and task analysis is a procedure for identifying the component parts or tasks that encompass a specific job. The tasks identified through job analysis are then further analyzed, using a process called task analysis, to include the subtasks or steps of each task.
- c. Importance: A JTA is a method of documenting job functions. The JTA helps in identifying the tasks, skills, and knowledge required to perform the job and define the content of training.
- d. Public Law 104-50: Public Law 104-50: Department of Transportation Appropriations Act, specified "training for groups and individuals must be based on needs assessments and analyses which have determined that training is the most appropriate intervention for enhancing performance needed to accomplish the program objectives and mission of the agency."

Training is an appropriate intervention when there are gaps between current and desired performance that can be attributed to inadequate knowledge, skills, and abilities needed to perform official duties. (See JW-32 3330.2 Appendix F for Public Law 104-50.)

- e. Benefits: A JTA ensures that training is based on identified needs for knowledge, skills, and abilities bearing on the performance of official duties.
- f. Contents: The remainder of this section outlines the job hierarchy, provides definitions and characteristics of the levels of the job hierarchy, and describes the JTA process, including determination of training requirements, selecting tasks for training, and documenting the analysis.
- g. Job Hierarchy: A job may be organized into component tasks according to part-whole relationships. The part-whole structure of a job is called a job hierarchy. An example of a job hierarchy is shown below, including recommended numbering.



- h. Job: A job consists of a cluster of duties and tasks performed by a person assigned to a position. If identical duties and tasks; are performed by several individuals; then they all hold the same job.

(1) Examples: Examples of jobs in the NFPO include:

- (a) Aeronautical Information Specialist (AIS)
- (b) Flight Procedures Program Evaluation Specialist (QA)
- (c) Flight Procedures Program Evaluation Specialist (FPO)

- i. Duty: Duties are main divisions of a job, each made up of groups of related tasks. Duties describe entire functions rather than individual actions.

- j. Characteristics: A duty is characterized as a:

- (1) Function of a job. Several duties together comprise a job.
- (2) Grouping of closely related tasks.
- (3) Example: An example of some duties might include:

- (a) Gathering background data
- (b) Building an IAPA work file

- (c) Building an ILS procedure
  - (d) Coordinating with servicing FPO on obstacle data
- k. Tasks: Tasks are units of work that make up a duty.
- l. Characteristics: A task is characterized as:
  - (1) Observable (or results in an observable product)
  - (2) Measurable
  - (3) A statement of a highly specific action
  - (4) A statement with a verb and object and sometimes a qualifying phrase
  - (5) Having a definite start and stop point
  - (6) Resulting in a product or service
  - (7) Independent of other actions.
  - (8) Examples: Examples of tasks for the duty "certifying services" include:
    - (a) Build an ILS Final segment
    - (b) Evaluate obstacle data
    - (c) Enter data into forms
    - (d) Coordinate with air traffic control and involved parties
- m. Conditions: Performance of a task is usually accomplished under different types of conditions, such as with problems, without all the needed information, etc.
- n. Standards: Adequate or successful performance is defined by standards of accuracy, quality, or within specified tolerances or measures.
- o. Job Aids: Items used when performing tasks, such as tools, job sheets, checklists etc., can be identified as job aids.
- p. Key Points: Unique operational procedures or cautions that relate only to a specific task are identified as key points.
- q. Subtasks: Subtasks describe the step-by-step performance of the task. This level of detail is needed to develop training on how to perform the task.
- r. Characteristics: A subtask can be described as:
  - (1) Dependent upon other subtasks
  - (2) One step in the performance of a task.
  - (3) Examples: Examples of subtasks for the task "coordinate with air traffic and involved parties" include:

- (a) Advise air traffic of minima changes
  - (b) Request air traffic approval of procedure changes
  - (c) Complete PTS entry
- s. Elements and Sub-elements: Often subtasks must be divided into further levels to describe performance of the task. Elements describe specifics of subtasks; sub-elements further detail specifics of elements.
- t. Skills: Skills are supporting procedures or guidelines needed to perform a subtask, element, or sub-element.
- u. Characteristics: Skills can be characterized as requiring:
  - (1) Precision
  - (2) Physical coordination
  - (3) Manual dexterity
  - (4) Examples: One of the subtasks for replacing an alternator is "tighten alternator belt." Examples of supporting skills for this subtask are:
    - (a) Ability to interpret scales on a ruler
    - (b) Ability to assess accuracy codes on various charts and maps
- v. Knowledge: Knowledge is the supporting facts, rules, formulas, etc., to perform a subtask, element, or sub-element.
- w. Characteristics: Knowledge can be characterized as:
  - (1) Factual
  - (2) Prerequisite to skilled performance
  - (3) Used to make complex decisions
  - (4) Requiring knowledge of action indicators

### 3.2.2 ANALYSIS PROCESS:

- a. Purpose. The purpose of this section is to describe the process of performing a JTA.
- b. Description. A JTA consists of a listing of major job duties and their accompanying tasks, subtasks, and supporting skills and knowledge. Analysis of the results of the JTA sets the direction for the training. Task statements are used as the basis for developing objectives and for lab activities and performance tests.
- c. Process. The JTA process begins with defining the job and is conducted in four stages:

- (1) Stage 1. List and describe the job duties and tasks.
- (2) Stage 2. List and describe the subtasks, elements, and sub-elements.
- (3) Stage 3. List and describe the knowledge and skills.
- (4) Stage 4. Have SMEs and managers validate the tasks list. Revise any inaccurate or incomplete task information.

Note: Data gathered during Stages 1, 2, and 3 comes from interviews, direct observation, printed materials (training manuals, manufacturer's instruction books and manuals, FAA orders, and technical literature, etc.), or questionnaires and surveys.

- d. New Job. Most of the analysis techniques described to this point will apply to a new job. Conducting interviews with or sending questionnaires to job incumbents can be useful only to the degree that the new job resembles a job that already exists. Initially, there may be no job data available and no opportunity to observe the job in actual operation. In spite of these limitations, it is still necessary to develop a training course before the new system or equipment is placed into operation.
- e. Most new or advanced systems are really the second or third generation of existing equipment. New jobs, then, tend to be similar to operating or maintaining older equipment. Analysis from jobs on older equipment can be used as the basis for analyzing the new job. Analysis of older equipment depends on a clear understanding of the new equipment. This is a major reason for having SMEs on the team who are thoroughly familiar with similar equipment. They are more likely to understand how the new equipment is different and how the tasks for the new job will be different.
- f. Analysis for the New Job. The team will have to "think through" the tasks envisioned for the new job in an attempt to define or predict the required behavior of the person who will maintain or operate the equipment. Also, the team should obtain as much early task data as possible and be willing to change the task list as data becomes available. Finally, they should accept that they might end up with incomplete information.

As with analysis of existing jobs, the analysis of a new job should result in a list of tasks that comprise the job as well as the conditions, initiating cues, standards, knowledge, and skills required to perform each task. However, as noted earlier, the data for the new job will not be totally valid until an analysis is performed on the job after the new equipment is in use.

### 3.2.3 CHOOSING TASKS FOR TRAINING:

- a. Purpose. This section covers selecting tasks for training.
- b. What To Train. Factors to consider when analyzing tasks to select for training include:



- (1) Criticality. Is it critical enough to train?
  - (2) Frequency. Is it performed often enough so that it is worth training?
  - (3) Delay Tolerance. How much delay can be tolerated before taking action?
  - (4) Learning Difficulty. How difficult is it to learn?
- c. Task Criticality. The definitions listed below can be used for task criticality.
- (1) Critical. Tasks that must be performed correctly because of possible adverse impact on mission effectiveness or serious injury, death, or significant damage to equipment/property.
  - (2) Semi-Critical. Tasks that affect performance, which if performed incorrectly, may result in some system/subsystem degradation, equipment damage, personnel injury, and/or security degradation
  - (3) Non-Critical. Incorrect performance is not likely to result in damage, injury, or death.
  - (4) Task Frequency. The definitions listed below can be used for frequency:
    - (a) Continuous activity (CA)
    - (b) Hourly (H)
    - (c) Daily (D)
    - (d) Weekly (W)
    - (e) Monthly (M)
    - (f) As required (AR).
- d. Delay Tolerance. There are some tasks in which no delay can ever be tolerated between when the need for task performance occurs and the time the actual performance must begin. A person must be capable of performing the task automatically without taking time to read directions or find someone to provide advice and guidance. For other tasks, a delay is acceptable as there is no impact to operations.
- e. Learning Difficulty. This refers to the mental and physical effort required of an employee to master performing the task. When rating difficulty, consider only typical situations involved in performing the task rather than unusual circumstances or locations.
- f. Choosing Tasks. When analyzing which tasks to train, select tasks that:
- (1) Are critical
  - (2) Have a low task delay tolerance
  - (3) Are performed frequently

- (4) Are difficult to learn, if they also satisfy one or more of the three conditions above or are new tasks.

#### 3.2.4 DOCUMENTING THE ANALYSIS:

- a. Purpose. The purpose of this section is to provide guidelines for documenting the results of the analysis efforts, including verbs to use, numbering systems, and formatting the results.
- b. Gather Information. Collect all the information gathered from various sources to place in the JTA report.
- c. Format the Information. Decide how to format the information, to include all relevant data. There are a number of acceptable formats.
- d. Describe the Job. Develop an introductory statement about how the JTA was conducted. This introductory statement should also describe the various levels used in the JTA, as well as define the terminology used.

The labeling information described below is commonly used to organize the various levels in a JTA. The duties, tasks, subtasks, elements, and sub-elements are usually shown in a hierarchical structure. The statements for Level III and below are generally listed in the order performed. The job itself is not normally labeled in any way, except by title or name.

- e. Duty. Level I is the duty level. The duties listed are those which the job incumbent is either responsible for doing or supervising.
- f. Task. Level II is the task level. The tasks listed are necessary for the performance of a duty.
- g. Subtask: Level III is the subtask level. The subtasks are identified for each Level II task.

Note: Additional levels may be needed to further describe each task and subtask.

- h. Numbering: A JTA has a numbering system consistent with the levels identified for the job. Duties (Level I) are numbered 1.0, 2.0, 3.0, etc.

Tasks (Level II) are numbered according to the duty to which they apply; such as 1.1, 1.2, 2.1, 2.2, etc.

Subtasks (Level III) are numbered by the task to which they apply; such as 1.1.1, 2.1.3, 3.4.5, etc.

Elements (Level IV) are numbered by the subtask they support; for example 1.1.1.1, 2.1.3.3, 3.4.5.2, etc.

Sub-elements (Level V) are numbered by the element they support; e.g., 1.1.1.1.2, 2.1.3.3.1, 3.4.5.2.2, etc.

- i. Outline: When the levels are listed in outline form, each numbered level is indented from the previous level to facilitate seeing the hierarchy.
- j. Conditions, Standards, Job Aids, Key Points: List all conditions, standards, job aids, and key points.
- k. Skills and Knowledge: List skills and knowledge requirements for each task.
- l. Characteristics: Rate each characteristic. The description of each characteristic may be personalized to suit the requirements of the job being analyzed.
- m. Old/New Task, Train/No Train: Indicate whether the task is a new or old task and whether the task is to be trained or not.

### 3.2.5 JTA REPORT:

- a. Purpose: The purpose of this section is to identify the need for reporting the results of a JTA.
- b. Description: The report documents the results of the JTA efforts, including all duties, tasks, subtasks, elements, sub-elements, skills, and knowledge. The results of the JTA provide a method to trace task information throughout the training development process.
- c. Course File: The JTA report is one of the first items of significance that should be included with other control documentation in the course file.

### 3.3 TRAINING PROPOSAL (TP)

#### 3.3.1 TRAINING PROPOSALS (TP):

- a. Purpose: The purpose of this chapter is to provide guidelines for developing a TP.
- b. Description: The TP identifies the requirements for a training program that is intended to solve a perceived training problem. The requirements are usually based on an analysis of operational or management problems.
- c. Who Submits: Any office or line of business in the agency can submit a training proposal. The TP is usually submitted to the Manager NFPO.
- d. NFPO: The TP is forwarded to the Training Branch who can respond to the training need.
- e. Training Proposal Review: the Training Branch receives the TP and reviews it to determine if all information is clear and complete.

If not, the originating office should be contacted for clarification or additional information.

This review should confirm the desired training product, the experience and knowledge of the target population, and any data needed to forecast resource requirements.

### 3.3.2 TRAINING PROPOSAL ELEMENTS:

- a. Contents: The TP should contain sufficient information so that a training development plan or management summary can be prepared. There may be additional processes utilized by different divisions within the Division that require more detailed content. (See Appendix B)
- b. Contact Information: The point of contact for information about the training need should be identified with name and phone number.
- c. Description of Training Need: The problems or deficiencies for which training is the proposed solution should be identified in as much detail as possible. Consequences if the proposed training is not provided should be included.
- d. Training Requested: The type of training requested should be specified. Training may include equipment theory, troubleshooting procedures, general overview, etc. If known, the tasks to be trained should be included. The tasks should come from the JTA, if one exists. If a JTA does not exist, the tasks listed should be those for which training is proposed.
- e. Cause of Training Need: The situation or event that caused the need for training should be identified. This can include identification of modifications to existing equipment, outdated training, new criteria, no training existing, emergency training requirements, new tasking or new job function, etc.
- f. Benefits and Differences: The benefits from the requested training should be included. This will help ensure that any cost benefit analysis would consider all positive aspects of the proposed training. If a course currently exists that covers similar topics, the differences between the current course and proposed contents should be identified.
- g. Number to Train: The number of total personnel that need to be trained should be included, if known.
- h. Completions Schedule: If possible, it is helpful to include a proposed schedule with the number of students to be trained within a given timeframe and the specific dates for critical completions.
- i. Prerequisites: Any skills or knowledge required before coming to the proposed training should be identified. Be sure to identify, by number and title, any prerequisite courses.
- j. Other Pertinent Factors: Other considerations or factors that may have a bearing on the proposed training should be included. This

may include possible locations and sources of training, training equipment or methodologies, and operational or maintenance philosophies. This can also include the target population, including job titles, experience level, grade, or other specifics regarding who would benefit from the training.

### 3.4. TRAINING DEVELOPMENT PLAN (TDP)

#### 3.4.1 TRAINING DEVELOPMENT PLAN (TDP):

- a. Purpose: The purpose of this section is to provide guidelines for preparing the TDP. The management summary of the course design guide can be used in lieu of a specific TDP document.
- b. Description: The TDP is a work plan for developing a course. It is a more specific course control document; which provides information needed for approval of the course development effort.
- c. Benefits: Developing a TDP offers these benefits:
  - (1) It recommends a plan to achieve the desired training.
  - (2) It provides a record of the basic planning for the course.
  - (3) It provides communication and agreement between the requesting organization and the training organization on how the training will be developed.
  - (4) When approved, it authorizes development or procurement of training and first course conduct.

#### 3.4.2 TDP ELEMENTS:

- a. TDP Contents: The TDP should contain sufficient information to aid in making a decision to approve and authorize development or procurement of training. The TDP should include purpose/objectives, identification of key personnel, technical approach, type of development, products/deliverables, media selection analysis, cost analysis, funding requirements, schedule, issues/concerns, or other pertinent data. Each of these elements will be discussed below. (See JW-32 3330.2, Appendix C)
- b. Purpose: The TDP should contain an introductory statement that describes the intent of the TDP. It should include a brief statement about the course(s) that are intended to result from the plan and the target audience for the training.
- c. Objectives: The TDP should identify the goals and/or objectives for the training development effort.
- d. Key Personnel: The key personnel who comprise the training team should be identified by name, title, role, and responsibilities.
- e. Technical Approach: Each ISD phase should be listed by name and include the purpose, a narrative statement of why/what activities will be accomplished, and the outcome or output of that particular phase.

Example:

Phase 4. Implementation

Purpose: To present the course materials to the trainees.

While presentation is the focus of implementation, other factors, such as management of materials, administration of tests, and distribution and collection of course critiques will also be determined.

Output: A completed training course

- f. Type of Development: This area explains the rationale for either a Limited or Complete Development effort as outlined above.
- g. Products or Deliverables: This section of the TDP should provide a synopsis of results of the media selection analysis and a list of the training documentation and training materials to be developed.
- h. Media Selection Analysis: This analysis should be conducted to determine the most cost-efficient, instructionally effective, delivery method for the planned training. The results of the media selection analysis should be included as an attachment to the TDP.
- i. Cost Analysis: The media selection analysis is followed by a cost analysis, which compares the costs associated with different media to arrive at the best delivery medium. The results of the cost analysis are used to identify the final recommendation for the delivery method for the training. The cost analysis should also be included as an attachment to the TDP.
- j. Funding Requirements: Funding required to accomplish the proposed training should be identified, including proposed sources of funding. The results of the cost analysis can be used to identify most, if not all, of the requirements.
- k. Schedule: A schedule of milestones to accomplish the development should be included.
- l. Issues/Concerns: Any issues or concerns that are pertinent to the development of the project should be listed. These may include assumptions made by the training team, issues that need to be resolved by the respective line of business, or any items that may have an impact on the schedule, resources, or funding.

### 3.5 COURSE DESIGN GUIDE (CDG)

#### 3.5.1 COURSE DESIGN GUIDE:

- a. Purpose: This chapter presents guidelines for developing a CDG (See JW-32 3330.2 Appendix D).
- b. Description: A CDG provides a road map for development or revision of a course. It includes the goals and/or outcomes for the course,

the skills and knowledge to be provided to trainees, and the methodology and techniques to be used in the conduct of the course.

- c. Benefits: Formulation of a CDG can reduce many frustrations in the development or revision process. All the information needed to develop the course, including objectives, testing techniques; tools and equipment, teaching strategies, and content are outlined. It becomes very easy to see if something is missing.
- d. Management Summary: If a TDP was not developed, the CDG should begin with a management summary that includes the items listed in 3.4.2 above.
- e. Contents: The remainder of this chapter is divided into sections that describe JTA evaluation, content organization, developing objectives, CDG contents, and CDG outline.

### 3.5.2 JTA EVALUATION:

- a. Purpose: This section will cover evaluating the JTA and making content decisions about what to train.
- b. Validate Existing JTA: If a JTA exists, it should be reviewed to determine appropriate contents. If the data in the JTA is outdated, equipment/system modifications have been made, or operational procedures have been added or revised, the contents of the JTA should be updated before a CDG can be written. Any revisions to an existing JTA should be noted in a report.
- c. Develop a JTA: If a JTA does not exist, one will have to be developed. Paragraph 3.2 provides information on developing a JTA.
- d. Content Decision: After verifying and/or updating the JTA, perform an assessment of the technical aspects of each task (what knowledge is needed, what skills are required, etc.) to validate a train/no train decision. If a task is old, personnel are probably familiar with the task because they have been performing it on the job. If any portion of a task is new, then the entire task needs to be trained.

### 3.5.3 CONTENT ORGANIZATION:

- a. Purpose: The purpose of this section is to describe how to organize the course content identified from the JTA.
- b. Use Basic ISD Principles: While the (updated) JTA identifies the course content necessary to develop the CDG, the content probably will not be organized according to ISD principles of presentation.

Order JW-32 3330.2 suggests that the CDG content shall be organized in the same order, as the course will be presented. Basic ISD principles recommend that content should be presented from simple to complex, known to unknown, in chronological order, or piece-part-whole, and from theory to performance for equipment courses. Since many FAA courses are for equipment or systems, this section will focus on how to arrange the contents of an equipment course.

- c. Theory Presentations: Theory presentation can usually be divided into two parts; the configuration of the equipment and the operation of the equipment. Greater emphasis can be placed on one or the other, with the determination made by the SME when deciding how much time to spend on each subject.
- d. Maintenance Presentations: Maintenance presentations follow theory, as they include routine and repeated procedures that are performed periodically.

Maintenance may or may not include: alignments, adjustments, periodic maintenance, built-in diagnostics or corrective maintenance. Also, greater emphasis may be placed on one activity versus another.

- e. Troubleshooting Presentations: While theory and maintenance comprise the majority of most equipment courses, troubleshooting may or may not be included. When it is included, there are usually at least three steps: fault isolation or diagnosis, repair or replacement, and system restoration.

Troubleshooting requires more complex cognitive skills than are required for performing maintenance activities. The technician uses troubleshooting skills and intuition and insight, rather than following a straightforward procedure.

The placement of troubleshooting after theory and maintenance is an example of moving from simple to complex in ISD practice.

- f. Certification: Usually, certification procedures are reserved for on-the-job training (OJT) portion of this training.

#### 3.5.4 DEVELOPING OBJECTIVES:

- a. Purpose: The purpose of this section is to review how to write and distinguish between training outcomes, instructional objectives (terminal objectives), and enabling objectives (lesson objectives).
- b. Common Elements: All objectives have the same common elements: a behavior, conditions, and standards. The order of these elements is not critical but rather that they are included. Steps for developing these elements are explained below.
- c. Step 1. Identify Behaviors: The first step is to identify behaviors that describe what the student should know and do as a result of what will be taught in the course. All objectives can be divided into two categories, knowledge or performance. Do you want the student to know about the subject, or do you want the student to be able to perform an activity?

Each behavior must be specific, observable, and measurable so accomplishment of the objective(s) can be determined.



- (1) Knowledge Behaviors: Knowledge means the student studies and understands and can talk or write intelligently about the subject. Some examples of knowledge behaviors are:

- (a) Explain the theory of operation of equipment.
- (b) Describe equipment configuration.
- (c) Describe the procedure for troubleshooting an equipment failure.

- (2) Performance Behaviors: Performance means the student can show that he/she can actually do the job according to specifications. Some examples of performance are:

- (a) Perform fault isolation on equipment.
- (b) Restore the system to normal operation after the fault is repaired.
- (c) Deliver a pilot weather briefing.
- (d) Evaluate an airport layout plan.

- (3) Behavioral Verbs: A list of common behavioral verbs appears below.

Knowledge verbs:

Analyze  
Assess  
Calculate  
Classify  
Compare  
Compile  
Define  
Describe  
Diagnose  
Evaluate  
Identify  
Label  
List  
Locate  
Monitor  
Verify

Performance verbs:

Adjust  
Align  
Assemble  
Calibrate  
Inspect  
Isolate  
Load  
Measure  
Monitor  
Operate  
Perform  
Record  
Start  
Test  
Trace  
Troubleshoot

- (4) Multiple Activities: There may be instances where multiple, inseparable activities must be performed by the student. Do not write objectives with multiple behaviors as it is difficult to convert multiple behaviors into test items and even more difficult to determine which part of the objective was achieved.

- d. Step 2. Identify Conditions: A condition describes the circumstances under which the student will perform the behavior. Examples of conditions include:

- (1) Given reference materials
- (2) Given a block diagram
- (3) Without references
- (4) Given a simulation

Note: It is assumed the student will be given instruction; therefore, this condition does not need to be specified.

- e. Step 3. Identify Standards: Standards are criteria against which the behavior will be measured to determine whether or not the student learned the material.

One term that introduces a standard in the objective statement is "in accordance with" (abbreviated as IAW).

Standards include:

- (1) Tables, charts, and checklists from the Technical Instruction Book (TIB)
- (2) Instruction or mandates from orders
- (3) User's guide
- (4) Manufacturer's instruction books
- (5) Without error
- (6) Within a specified time frame

- f. Training Outcomes (TOs): TOs are the highest level of objectives. They usually correspond to the duty level of the job and represent groups of related knowledge or tasks. TOs are very broad and general and should be few in number for a typical course.
- g. Instructional Objectives (IOs): IOs (or terminal objectives) represent topics of material under the TOs. These should be developed from the tasks selected for training in the JTA. For example, if the TO is maintenance of the equipment, IOs might include alignments, adjustments, periodic maintenance, performance of diagnostics, or corrective maintenance.
- h. Enabling Objectives (EOs): EOs outline actual instruction. They are a part of the instruction and are presented in an organized manner.
- i. Sample TO: With references and in accordance with ARINC Specification 424-17, each student will be able to understand basic ARINC Coding and Instrument Approach Procedure Record Layout.
- j. Sample IO: Given a copy of ARINC Specification, the student will be able to construct a sample Instrument Approach Procedure Record.

- (1) Related EOs:

- (a) With references and in accordance with FAA Orders 8260.3, 8260.19, and ARINC Specification 424-17, each student will be able to understand the reasoning behind why the FAA is using this new IFP-SIAP software.
- (b) With references and in accordance with ARINC Specification 424-17, each student will be able to understand ARINC Coding Structure and Record Layout.
- k. Contents of Objectives: Thus, training objectives usually consist of a condition, behavior, and standard. The following chart provides examples of knowledge and performance objectives.
- l. Exception to Three Parts: While all three parts of a (an) TO, IO, or EO are vital, it is not always necessary to include each part in the CDG. For example, the standard for much of the training will always be in accordance with an FAA Order (FAAO), a manufacturer's instruction book (MIB), or a technical instruction book (TIB); thus, there is no need to restate the standard unless a specific reference is made. The same applies to the condition. There is no intent to "trick" anyone. If the performance states that the student will "troubleshoot," it should be clearly understood that the "given" will be a malfunctioning system.

### 3.5.5 CDG CONTENTS:

- a. Purpose: This section describes the contents of the CDG. A sample CDG (course design guide) is located in JW-32 3330.2, Appendix D.
- b. Parts of the CDG: The current version of Order JW-32 3330.2 identifies three parts to the CDG:

- (1) Cover Sheet and Management Summary\*
- (2) Course Design
- (3) Cross Reference Matrix\*

\*These parts may not be required as part of the CDG. Consult the Training Team for guidance on including these two parts.

- c. Cover Sheet and Management Summary: Part 1 of the CDG, if used, would include purpose/objectives, identification of key personnel, technical approach, products/deliverables, funding requirements, schedule, issues/concerns, or other pertinent data.
- d. Cross-Reference Matrix: Part 3 of the CDG, if used, would contain each training outcome with its associated instructional and enabling objectives. The number from the JTA that identifies the appropriate task, subtask, element, or sub-element is recorded with the IOs and EOs.
- e. Course Design: Part 2 of the CDG consists of elements listed below. These elements are discussed in depth within this section.

- (1) Training Outcome
- (2) Instructional Objective
- (3) Enabling Objective
- (4) Estimated Hours
- (5) Type of Learning
- (6) Test Item Type
- (7) Technical Content
- (8) Instructional Strategies and Media
- (9) Development Notes.

#### 3.5.6 CDG OUTLINE:

- a. Purpose: This section describes each element in the CDG outline.
- b. TOs: TOs are listed first in the body of the CDG.
- c. Sequence/ Numbering: To establish trace-ability through the course, the TOs should be labeled with consecutive upper case letters, beginning with "A." TOs should be sequenced in a logical training order.
- d. IOs: There should be at least two IOs per TO. If only one IO can be developed, review the JTA and determine whether the TO is too narrowly written.
- e. Sequence/ Numbering: To establish trace-ability through the course, the IOs should be labeled with numbers consecutively beginning with "1." IOs should be sequenced in the best order for learning.
- f. Estimated Hours: Identify the estimated time in hours to present each IO. This should be a total of the time elements for all the EOs within this IO.
- g. EOs: There should be at least two EOs for every IO. The content of the EO converts to an actual lesson; thus the content of the lesson dictates the length of instruction.
- h. Sequence/ Numbering: EOs should be labeled consecutively with lower case letters beginning with "a." EOs should be sequenced in the best order for learning.
- i. Type of Learning: EOs are classified as knowledge-based or performance-based. Thus, EOs requiring thought processes and thinking skills should be labeled "C" (cognitive). EOs requiring performance skills should be labeled "P" (performance).
- j. Test Item Types: This refers to how the EO will be tested. There are generally two types of tests--written and performance. Written tests are usually graded and consist of multiple-choice items. Performance tests are tests of the student's ability to perform hands-on tasks such as alignments or adjustments, troubleshooting, etc. Indicators for the test type should be "W" for written and "P" for performance tests.

Selection of the test type should be consistent with the behavior determined for the EO. For example, if the EO behavior is to "describe," do not select test type as P.

Paragraph 3.6, Courseware Development and Revision, provides specific guidance on writing exams.

- k. Technical Content: This refers to the content to be covered in the lesson. Information can be obtained from technical manuals and manufacturer's instruction books; however, the final authority for breadth and depth of material rests with the SME.

The content should be listed in outline format and organized into logical segments that best support training.

- l. Instructional Strategies and Media: This portion should contain an instructional method and supporting media for attaining the IO and each EO.
- m. Developmental Notes: This section should provide guidance, notes, and references for developing the training. Reference page/paragraph numbers should be included where possible for technical manuals and other written documentation. Other notes that can be listed include what graphics/figures to use, whether to include animation, types of interactions to incorporate, etc.
- n. Course File: The CDG is one of the major items of course documentation to be included in the course file.

### 3.6 COURSEWARE DEVELOPMENT AND REVISION

#### 3.6.1 COURSEWARE DEVELOPMENT AND REVISION:

- a. Purpose: This section provides guidelines for the development, revision, and use of instructional materials used in various training environments.
- b. Description: Courseware includes all the tools used by instructors to provide knowledge to students on the subject of the training. Some instructor tools include instructor guide, lesson plan, laboratory guide, and course test. Tools for the student include student guide, laboratory guide, and technical manuals.
- c. Benefits: The major reason for development of courseware is to provide a means to present consistent, quality training to many students over time, regardless of the person presenting the training. Courseware is also, used by students as a reference when they return to their facilities.
- d. Contents: This section is divided into the following sub-sections:
  - (1) Instructor guide
  - (2) Lesson plan
  - (3) Student guide

- (4) Laboratory guide
- (5) Testing
- (6) Revision of course material.

### 3.6.2 INSTRUCTOR GUIDE:

- a. Purpose: This section describes the contents of the instructor guide, if one is required. It also includes guidelines for the preparation and use of the instructor guide.
- b. Description: The instructor guide contains detailed information about how a course is to be conducted and the materials needed for the course. It includes all instructor and student activities to be accomplished during the course.
- c. The instructor guide is used to:
  - (1) Prepare learning aids (handouts, models, posters, etc.) for each lesson
  - (2) Identify (before entering the classroom) the type of preparation needed to conduct each class or lab
  - (3) Provide information to team instructors about class/lab preparation and transitions among instructors
  - (4) Convey information to another instructor who may need to step in and teach the course.
- d. When To Use: Instructor guides should be developed for all types of courses that require the presence of an instructor. Those courses include:
  - (1) OJT
  - (2) Resident training
  - (3) Interactive video tele-training (IVT).

Other courses using delivery methods such as videotape with student guide, computer-based instruction (CBI), and self-study text (also known as correspondence or directed study) do not need instructor guides.

#### e. Instructor Guide Elements:

- (1) How to Conduct the Course: The instructor guide should include guidelines for conducting the course. Any special activities should be explained. Information about different media should be included, with an explanation for using the media with specific course objectives.

Sufficient description should be included to clarify:

- (a) Course flow

- (b) Which objectives are taught in which medium
  - (c) How the instructor should transition from one medium to the other.
- (2) Lesson Activities: There are two types of lesson activities--instructor initiated and student initiated. Examples of instructor initiated activities include:

- (a) Lecture
- (b) Demonstrations
- (c) Description of personal experiences on the job
- (d) Detailed explanations/examples to use for hard-to-grasp concepts
- (e) Audiotape or videotape segments.

Student activities include:

- (a) Practice exercises (written or hands on)
- (b) Performance tests
- (c) Group discussions
- (d) Group problem solving.

- (3) Develop Lesson Activities: The instructor guide should include a detailed description of all activities to be accomplished in each class session and each laboratory session. An explanation of how the planned activities are to be achieved should also be included. For each activity:

- (a) State the goals/expected outcomes of the activities and explain how the goals are to be accomplished
- (b) Identify who will conduct the activity (instructor, team of instructors, students)
- (c) Describe the audience, including number of students (one student, teams, the whole class)
- (d) Identify assumptions required for completion of the activity
- (e) Describe the equipment/tools needed to accomplish the activity
- (f) Explain where the activities are to be accomplished (classroom, lab, outdoors, etc.)
- (g) Describe the activities in detail and include time limitations, safety considerations, or other special considerations.

- (4) Classroom Preparation: The contents of instructor guides will vary according to the type of class being taught and the number of activities to be included. Physical areas that should be prepared for classroom activities include:

- (a) Student work and study areas
  - (b) Classroom
  - (c) Demonstration areas such as tower cab simulator or functioning equipment
- (5) Media Aids: The instructor guide should list all the media aids that will be used in the course. They may be listed all together toward the beginning of the guide, or listed as appropriate with each lesson or lab procedure.

Listing all the media aids in the front of the guide will help the instructor plan ahead when long-term preparation is necessary. Listing media aids with each lesson or lab is helpful to remind the instructor of what will be needed while preparing for the class.

### 3.6.3 LESSON PLAN:

- a. Purpose: The purpose of this section is to provide guidelines on development and use of the lesson plan (LP).
- b. Description: An LP is a tool for presenting course content to a class. The LP coordinates course materials and activities to achieve course objectives. All instructors should standardize a carefully developed LP to ensure effective and efficient presentation.
- c. Benefits: The LP makes teaching easier and simplifies instruction, because all essential elements are included, thus preventing the instructor from forgetting or skipping over important or key points.

Use of an LP also ensures good learning sequence as the contents are composed and organized well in advance of the presentation. Because of advanced planning, time on topics is suitably budgeted.

A well-written lesson plan can provide confidence for the instructor when conducting class sessions.

- d. Lesson Plan Elements:
  - (1) Lesson Plan Contents: The contents of the LP include introduction, body, and summary. The elements of each part are covered in more detail below.
  - (2) LP Introduction: The purpose of the introduction is to prepare students to learn. This portion of the LP consists of administrative information, review/tie-in, overview, motivation, and objective.

Administrative information (which should be on the lesson plan cover sheet) includes:



- (a) Course name and number
  - (b) Lesson title
  - (c) Date of preparation
  - (d) Duration of the lesson in hours and minutes
  - (e) Reference list
  - (f) List of training aids used during the lesson
  - (g) List of handouts
- (3) Review/tie-in, overview, motivation, and objective(s) are commonly referred to as ROMO:
- (a) Review/tie-in provides a link from the previous lesson(s) to this lesson
  - (b) Overview describes what is to be learned and how it will be accomplished
  - (c) A Motivational statement identifies the benefit to students and creates interest
  - (d) Lesson Objective(s) identifies the instructional intent of the lesson.
- (4) LP Body: The body of the LP provides the essential subject matter outline and learning activities to accomplish the objective(s) through these elements:
- (a) Terms and definitions, if applicable
  - (b) Outline of essential subject matter
    - i. Logical learning sequence
    - ii. Simple-to-complex
    - iii. Known-to-unknown
    - iv. Chronological
    - v. Piece-part-whole
  - (c) Interactive/response items
    - i. Interactive items are included to help students accomplish the objective(s) and to reinforce learning. They are also used by the instructor to: gauge student progress, alert students to areas of difficulty, and prepare them for written or performance tests. Interactive items have many forms, such as:
    - ii. Oral and written questions
    - iii. Response items (for use with response systems)
    - iv. Worksheets/exercises

v. Practice/performance activities

vi. Role plays and case studies

(d) Media aids

i. Media (visual) aids, used to augment the subject matter of the lesson, include such items as:

(i) Overhead transparencies

(ii) Slides

(iii) Handouts

(iv) Videotapes

(v) Computerized graphics

(vi) Schematic drawings and illustrations

(e) Instructor demonstrations, if necessary

i. Instructor demonstrations and practice exercises are very effective tools for teaching critical measurements or procedures. When demonstrations and practice exercises are used, include:

(i) Objectives

(ii) Equipment needed

(iii) Instructions on what to do

(iv) Steps of the procedure being demonstrated or practiced

(v) Safety precautions

(vi) Time frame for completing practice activities

(vii) Standards of performance, if applicable

(viii) Practice exercises, if applicable

ii. Interim summaries are used during the presentation to reinforce key points of the lesson.

(5.) LP Summary: The final part of the lesson plan is the summary. The purpose of the summary is to review lesson content and evaluate accomplishment of the objectives.

The review should include key terms and definitions, if applicable; key lesson points, objectives, and any applicable safety precautions.

An end-of-lesson test, comprehensive and testing mastery of the objectives, can be included in the lesson summary. The

test can be graded with the score applied toward the final grade, or un-graded for review and feedback purposes.

When using a test, provide directions for taking the test, check the results, and discuss any problem areas with students.

#### 3.6.4 LESSON PLAN EFFECTIVENESS:

- a. Effective Lessons: Lesson plans can be more effective by:
  - (1) Including stories, cartoons, or graphics that focus attention on the lesson
  - (2) Including questions related to the lesson, even if students have no knowledge, so they listen for the answers
  - (3) Using key words and other verbal aids to help students remember major points
  - (4) Providing, where possible, real-life illustrations of the ideas
  - (5) Using analogies
  - (6) Using charts, transparencies, demonstrations that let students see as well as hear
  - (7) Involving students
  - (8) Using concise writing and sufficient space to avoid crowding information.
- b. Each instructor can personalize the LP by:
  - (1) Highlighting key words and phrases
  - (2) Adding notes about personal experiences
  - (3) Adding reference paragraph/page numbers (of directives, technical instruction books, etc.)

#### 3.6.5 STUDENT GUIDE:

- a. Purpose: This section provides guidelines for development and use of a student guide.
- b. Description: The student guide is a tool for the student to:
  - (1) Prepare for class
  - (2) Follow the instructor during the class presentation
  - (3) Study after the lessons, prepare for tests
  - (4) Use as a study resource later
- c. Benefits: The student guide enables the student to focus more on the instructor and the content being presented in the lesson and not be overly distracted by taking notes.

### 3.6.6 STUDENT GUIDE ELEMENTS:

- a. Contents: The student guide usually consists of two major parts: the introduction and chapters or sections containing subject matter content.
- b. Introduction: The introduction consolidates course information needed at the beginning of the course, such as:
  - (1) Course administrative information
  - (2) List of blocks, or however the course is partitioned
  - (3) List of lessons
  - (4) Expected training outcomes/major objectives
  - (5) Course schedule
  - (6) Reference list.
- c. Lesson Content: Lessons should contain the following information:

- (1) Title and number
- (2) Objective(s)
- (3) Reference material
- (4) Contents
- (5) Practice exercises with answers
- (6) Appendixes

Lesson objective(s) should include the expected behavior, any conditions of the behavior, and the standards of satisfactory performance.

The contents should generally follow that of the lesson plan. Sufficient space should be left for students to write notes. Handouts and visual aids should be included to enhance the lesson information.

- d. Visual Aids: Graphics and visual aids should be numbered and titled, and referred to in the text.
- e. Practice Exercises: Practice exercises should include:
  - (1) Title and objectives
  - (2) Needed equipment
  - (3) Directions and steps of procedure(s)
  - (4) Safety precautions
  - (5) Time frame permitted
  - (6) Standards of performance
  - (7) Review questions and answers, if desired

- f. Appendixes: Appendixes are included at the end of the student guide and may contain:

- (1) Acronyms and/or glossary
- (2) Answers to lesson test items, if applicable
- (3) Worksheets
- (4) Practical exercises/activities
- (5) References

- g. Media Differences: A student guide should be developed regardless of the media mix used for the course. Each media may require that special information be included in the student guide to explain unique requirements of the media.

Ample information should be included in the student guide to explain the use of the media in covering specific course objectives. Additionally, sufficient information should be included to clarify:

- (1) Course flow
- (2) Which objectives are taught in which medium
- (3) How the student should change over from one medium to the other
- (4) Approximately how much time will be spent in each medium

- h. CBI Student Guide: Directions should include how to use the CBI student platform, how to navigate through the lessons, and how to study the lessons (some lessons may be studied in random order or sequentially).

Quizzes and tests should be explained. Questions may be embedded within the lessons, while others may be found at the end of lessons. Students need instructions on how to take the quizzes, get feedback on the items, and review subject materials if desired.

The CBI student guide should provide direction for students to:

- (1) Enroll in the course
- (2) Log on/log off the CBI student platform
- (3) Navigate (proceed) through the lessons
- (4) Take the quizzes/tests within the lessons
- (5) Quit for the day and begin the next time
- (6) Take the course test, including how to get a password
- (7) Complete the course critique

- i. Correspondence Study Manual: Because the instructor is not present while the student is taking the correspondence study course, the instructions for taking the course should be detailed, including all information needed to understand how to proceed through and complete the course.

All materials the student needs to achieve the objectives should be included in or accompany the correspondence study manual.

The text is in narrative form, as though the instructor were speaking to the student. Graphics should be well labeled and described in the narrative, and be placed on the same page or the facing page of text describing them.

All references listed or referred to in the manual should be available to students. If not available: information on where to locate/acquire the references should be included.

There are generally interim unsupervised "lesson" tests included in the course manual, which students take themselves and return to the correspondence study office for grading.

When a student is ready for the final course test (correspondence study courses with tests), a request is made to the correspondence study office and the test is sent directly to the student's supervisor for secure administration. The supervisor then returns the test to the correspondence study office for grading.

#### 3.6.7 TESTING:

- a. Purpose: This section covers the development and use of tests.
- b. Description: Testing is used to measure student learning and performance.
- c. Benefits: Testing provides a method to identify:
  - (1) How well the students have mastered the course objectives
  - (2) Where weak areas may exist and/or instruction should be improved
  - (3) How much repetition and reinforcement may be required

#### 3.6.8 TESTING GUIDELINES:

- a. Contents: This section covers various types of tests that can be used to measure student performance.
- b. Test Guidelines: Each objective in the course should be tested. The number of test items required per objective should be sufficient to ensure students have mastered the content of the objective. General guidelines for test items include:
  - (1) Relate the test item directly to an objective
  - (2) Avoid negative statements
  - (3) Avoid giving clues to the correct response in the wording
  - (4) Avoid ambiguous statements.

c. Types of Test Items: The types of test items that may be used to evaluate student learning include multiple choice, true/false, matching, completion, free answer, and performance. The type of test item to use should be determined by the behavior specified in the objective to be tested.

(1) Multiple Choice: Multiple-choice items are often used for FAA written tests because they can measure a variety of abilities in the training situation, and they are easy to administer and score. They should consist of a stem that contains the application of the behavior of the objective, and at least four responses. Multiple-choice design guidelines include:

- (a) Ensuring items are brief and specific
- (b) Ensuring responses are plausible, grammatically consistent, and in logical order
- (c) Ensuring there is only one correct answer
- (d) Avoiding use of "all..." or "none of the above" as responses
- (e) Avoiding patterns of correct answers

(2) Matching: Matching items use two columns of related words, phrases, or symbols to be matched by the student. Matching design guidelines include:

- (a) Using only related material in one matching set
- (b) Ensuring the number of responses is greater than the number of items to be matched
- (c) Using a maximum of twelve responses
- (d) Arranging responses in logical order
- (e) Never carrying a matching set from one page to another

(3) True/False: True/false items are generally not recommended as a sole means for evaluating student performance because the chances for guessing the correct responses are very high. They may be effectively used, however, as instructional devices to provoke thought and discussion. True/false design guidelines include:

- (a) Ensuring approximately half the answers are true and half false
- (b) Using words with precise meanings
- (c) Not writing true statements consistently longer than false statements
- (d) Avoiding words such as all, none, always, and never, which tend to make the item false

(4) Completion: The completion, or "fill in the blanks," item consists of a statement from which a word(s) or short phrase

has been omitted. The student must supply the missing word(s) or phrase in the blank(s) provided. Completion design guidelines include:

- (d) Ensuring all blanks are of equal length
  - (e) Wordings each item so there is only one correct response or synonym
  - (f) Ensuring blanks are at or toward the end of each item
- (5) Free Answer: Free answer items are usually used when the objective requires students to explain or describe a function, procedure, system, or rule. Free answer design guidelines include:
- (a) Stating the item in a simple, direct manner
  - (b) Leaving sufficient space for students to explain, rather than just list or enumerate
- (6) Performance: Performance tests are graded tests administered in a controlled environment with certain conditions of performance and certain expected outcomes. A performance test requires the student to demonstrate a task or procedure, to:
- (a) Troubleshoot an equipment problem
  - (b) Operate computer or equipment
  - (c) Apply radar separation
  - (d) Perform a ramp inspection
  - (e) Problem solve a situation

d.. Controlled Environment: A controlled environment is a location where the student can focus on the assigned tasks, and safely practice without interfering with flight safety or being exposed to personal injury. Some examples of controlled environments are:

- (1) A console located at the student desk or workstation
- (2) A computer located at the student desk or in another room
- (3) An area where the equipment of interest (or an equipment simulation) is located.

e. Conditions of Performance: Lab conditions are things given to or withheld from students during lab performance and include some or all of the following:

- (1) Real or simulated equipment
- (2) Tools
- (3) Time on task--may be important for safety reasons
- (4) Work alone or as a member of a group



- (5) Whether use of reference notes or consultation with the instructor is allowed.
- f. Performance Outcomes: Outcomes of performance may include:
  - (1) Terms of completion, grading, or passing the exercise
  - (2) Achieving the expected outcome (problem detected, isolated, or solved)
- g. Developing the Performance Test: Begin with a preliminary plan for the performance test. The following elements should be clearly explained in the student materials:
  - (1) Determine the performance to be tested
  - (2) Identify the observable tasks and subtasks
  - (3) List materials, tools, and equipment needed
  - (4) Develop criteria for performance
  - (5) Decide on an evaluation strategy
- h. Checklists: Checklists help ensure objectivity in evaluating performance. Guidelines for checklist development include:
  - (1) Stating each item simply, clearly, and in observable performance terms
  - (2) Including the important/critical parts of a skill in the performance
  - (3) Identifying which steps will be graded, and which will not be graded
  - (4) Including only and all critical criteria
  - (5) Listing items in logical order
  - (6) Choosing the type of checklist appropriate to measure process or product of performance
  - (7) Indicating steps of the procedure that could be potentially dangerous or lethal (potentially dangerous behavior should be stopped immediately).
- i. Administering the Test: Each Division has a policy for administration and handling of all tests. Guidelines include how to store the test, whether the test is open book or closed book, what the time limits are, proctoring the test, etc. Review the policy in your division for specific guidance.

#### 3.6.9 REVISION OF COURSE MATERIAL:

- a. Purpose: This section provides guidelines for courseware revision.
- b. Description: Course revision means modifying, changing, adding, and/or deleting content from course materials to:

- (1) Ensure the course contents comply with current standards and practice
  - (2) Correct any inaccurate or incomplete material
  - (3) Enhance teaching and learning methods
- c. Benefits: Courses should be evaluated every time they are taught, and modified when necessary to maintain currency. All students should get standardized, consistent, and correct information.

#### 3.6.10 REVISION GUIDELINES:

- a. Minor Revision: Minor revision is considered to be course maintenance and includes all tasks associated with the ongoing effort to ensure courseware reflects current procedures, policies, and/or systems. These activities do not usually require additional fiscal resources. Minor revisions do not affect the:

- (1) Training outcomes/instructional objectives
- (2) Course length
- (3) Method or source of training
- (4) Staffing
- (5) Fiscal resources

When the need exists, the appropriate Division may accomplish revisions. No external approval is required. Examples of minor revisions include:

- (1) Refinement of lesson plans, visual aids, job aids, etc.
- (2) Conversion of overhead transparencies to electronic graphic arts packages
- (3) Improvement of test items, based on item analysis, to more accurately measure achievement of the course objectives
- (4) Updating of technical content (if revisions do not change course objectives or course length).

- b. Major Revision: A major course revision includes those tasks necessary to substantially upgrade existing courseware and is conducted as a result of specific tasking. Major revisions include:

- (1) Changes to the length of the course
- (2) Modifications to existing equipment or addition of new equipment
- (3) Changes in tasks
- (4) Added, deleted, or changed training outcomes and/or instructional objectives
- (5) Impacts to staffing levels and/or resources

- c. Course Conversion: Course conversion is a process whereby all or part of the course content is changed to another delivery method, such as changing a resident course to CBI. Course conversion may have many of the same characteristics as a major course revision. Course conversions require:
- (1) An addendum or complete revision of the CDG
  - (2) Revision of the course content
  - (3) Development in the new media
  - (4) Development of a new course report
- d. Considerations for Revision: Course revisions can also be described in terms of allocation of resources and analysis documentation. Allocation of resources refers to funds, salaries, equipment, space, and personnel. Analysis documentation refers to up-front analysis, to include needs assessment, task analysis, course design, and training development and support.
- e. Allocation of Resources: Minor course revisions are usually considered part of the expected tasking for course managers. Allocation of resources, if any, may consist of an equipment purchase for the branch or division, and such equipment may not be exclusively tied to a specific course. Examples of such equipment are computers, scanners, printers, etc.

When a major revision is warranted, and the affected organization does not have the resources to accomplish the revision, the organization will need to coordinate with the appropriate line of business to obtain resources. Resources may include one or all of the following:

- (1) Equipment and/or space
- (2) Additional personnel or support personnel
- (3) Backfill contract instructors to free FAA instructors for course revision activities

When a media change to a course is identified, and the affected organization does not have the resources to accomplish the conversion, the organization will need to coordinate with the appropriate line of business to obtain resources. Resources may include one or all of the following:

- (1) Contracting out some tasks, such as computer programming, photography, video shoots, etc.
- (2) Additional personnel, such as programmers, artists, developers, etc.
- (3) Space for equipment/personnel
- (4) Satellite time and rental of satellite downlinks
- (5) Travel expenses for field-conducted classes sponsored by the Academy
- (6) Equipment, such as CBI platforms

- (7) Backfill contract instructors to free FAA instructors for development activities
- f. Analysis Documentation: Analysis documentation usually is not affected by minor revisions. However, changes in subject matter, test items, and updating of technical content should be documented in the course file.

Some or all of the following analysis documents may need to be developed or revised for a major course revision or course conversion effort:

- (1) Needs assessment
  - (2) Job and task analysis
  - (3) Training development plan
  - (4) Course design guide
- g. Course File: Regardless of the type of revision made to a course, an audit trail of changes should be kept in the course files of the branch or division. Trace-ability is very important when attempting to document the source(s) of change. Each division should have a system of storage, hard copy, and/or electronic, for file copies of analysis and development documentation for all current courses.

### 3.7 COURSE VALIDATION

#### 3.7.1 COURSE VALIDATION:

- a. Purpose: This chapter explains the course validation process. It provides guidance on how to verify that instructional materials and associated documentation are complete, accurate, and ready for delivery to the target population.
- b. Reasons for Validation: All Academy courses should be validated prior to implementation of training. Validation ensures that each of the following critical elements are reviewed and revised as necessary:
  - (1) Course documentation
  - (2) Technical accuracy
  - (3) Instructional soundness
  - (4) Instructional materials
  - (5) Effectiveness of instruction.
- c. Flexibility: The validation steps shown below represent an "ideal" process for validation. That is, given time and other resources, this process has been demonstrated effective in producing technically valid and instructionally sound training. In many instances, training must be developed under less than ideal circumstances, where time or other resources are constrained. Under such circumstances, a discussion of validation activities

should be conducted between the training supplier and the respective line of business to determine which activities can reasonably be performed with the resources available.

- d. Validation Steps: The process for conducting validation consists of five steps:

- (1) Review instructional materials
- (2) Conduct course walk-through
- (3) Conduct operational tryout
- (4) Conduct first class
- (5) Write course report.

- e. Contents: The remainder of this chapter is divided into sections corresponding to each of the validation steps mentioned.

### 3.7.2 REVIEW OF INSTRUCTIONAL MATERIALS:

- a. Purpose: The review of instructional materials may be conducted for an entire course or on a lesson-by-lesson basis, depending upon which is most practical. The purpose for reviewing the materials is to:

- (1) Ensure course documentation is completed and approved
- (2) Provide a technical review of the content of the materials
- (3) Provide a review of the instructional soundness of the materials
- (4) Ensure the materials conform to any pre-specified requirements or formats
- (5) Ensure the course conforms to the prescribed design.

- b. Participants: Participants should include course developers, which include SMEs, ISSs, and representatives from the respective line of business and/or their designate.

- c. Course Documentation Review: Review the course documents to ensure they are:

- (1) Completed and approved
- (2) Filed in a course file.

- d. Technical Review: The technical review of materials should:

- (1) Verify that references cited are current and located as stated
- (2) Review text, graphics, tests, videos, etc., for accuracy and clarity
- (3) Identify any missing content or extraneous content
- (4) Ensure lesson sequence is in proper order

- (5) Ensure currency of content
  - (6) Ensure the material is presented at a level compatible with student's level of expertise and general skills and knowledge.
- e. Instructional Review: The instructional review of materials should:
- (1) Ensure the instructional strategies used are adequate
  - (2) Ensure the clarity of the materials
  - (3) Assess the presence of complete objectives
  - (4) Ensure materials are directly related to the objectives
  - (5) Assess whether tests measure learner performance on the objectives
  - (6) Assess the presence of critical (specified) events of instruction
  - (7) Assess the use of media and equipment, interaction, examples, practice exercises, Assessment activities, and feedback for appropriateness and relevance to the target audience
  - (8) Determine if there is sufficient feedback on practice exercises and test results.
- f. Requirements and Formats Review: This review should assess the consistency of the format and conformance of materials to any pre-specified formats or other requirements.
- g. Course Design Review: The course design review should ensure that the following are included and match the course design:
- (1) Lesson objectives
  - (2) Media and instructional methods
  - (3) Sequence of instruction
  - (4) Tests and/or other assessment activities.
- h. Action: Following completion of the instructional materials review, written documentation should be completed by the reviewers and provided to the training developer. This documentation should include the name of the course, a list of the reviewers, the date of the review, a consolidated list of changes to be made prior to the course walk-through, and a scheduled date for the completion of the revisions.

### 2.7.3 COURSE WALK THROUGH:

- a. Purpose: The course is presented in its entirety but in an abbreviated manner so that SMEs, ISSs, and instructors may observe the general flow of the course. The purpose is to ensure:
- (1) Revisions from the instructional and technical reviews were made
  - (2) The instruction is sequenced logically

- (3) Consistency and quality of materials
  - (4) Logistics problems in delivering the course are identified and resolved.
- b. Participants: Suggested participants for the course walk-through are:
- (1) Course developers (SMEs and ISSs)
  - (2) One or more instructors to present the course
  - (3) A representative from the line of business
  - (4) Instructors/SMEs and ISSs as designated by the line of business (reviewers).
- c. Guidance: The CDG and all course materials should be provided to reviewers prior to the start of the walk-through allowing sufficient time to review changes made as a result of the instructional materials review. An agenda should be established by the developer and approved by the reviewers prior to the course walk-through.
- During the walk-through, the developer should present each lesson comprising the course but do so in an abbreviated manner so that the review of the course can be compressed. The developer should be prepared to discuss any aspect of the course in detail as necessary.
- d. Review Areas: Review areas listed below may be divided among SMEs, instructors, and ISSs as is deemed most appropriate and practical:
- (1) Sequence
  - (2) Transitions/tie-ins
  - (3) Pacing of instruction
  - (4) Time allocations for lessons and activities
  - (5) Consistency of text layout, font, graphics, color schemes, etc.
  - (6) Readability of materials, visuals
  - (7) Logistical problems
  - (8) Weak points in the lesson plan.
- e. Action: Following completion of the review, documentation should be completed by the reviewers and provided to the developer. This documentation should include the name of the course, a list of the reviewers, the date of the review, a consolidated list of changes to be made prior to the operational tryout, and a scheduled date for the completion of the revisions.
- f. Product: Because the operational tryout typically involves presentation of the course to the target audience, the product of the course walk-through should be a general "go/no go" decision that the course, given that the identified changes are made, is either ready to be presented or must undergo a follow-up review

before proceeding with the operational tryout. A key consideration in the go/no go decision is whether or not some of the course needs to be tested with the actual target population. If this is the case, the reviewers should indicate which parts of the course need to be tested, the developer then documents any problems and makes all necessary revisions.

The manner in which course material is tested with the target population is flexible and should be agreed upon between the developer(s) and reviewer prior to the testing. All corrections as a result of the target population test should be made prior to the conduct of an operational tryout.

#### 3.7.4 OPERATIONAL TRYOUT:

- a. Purpose: In an operational tryout, the course is delivered just as it would be for an actual target audience, with one exception: students attending the operational tryout are provided an opportunity to comment on each lesson so that problems or corrections can be noted immediately. The main purpose of the operational tryout is to locate and eliminate any remaining problems in the instruction, such as:
  - (1) Time allocated for each lesson and the course as a whole
  - (2) The logistics and operations associated with delivery of the course
  - (3) The flow of the course within and between lessons
  - (4) Final check of the previous corrections made
  - (5) Achievement of course outcomes and objectives
  - (6) Validity of test items
  - (7) Orientation of the instructors to the course materials and methods
  - (8) Providing other stakeholders with an opportunity to review and comment on the course (if the course will be used by more than one organization within the FAA).
- b. Participants: The following should participate in an operational tryout, when possible:
  - (1) One or more instructors to present the course
  - (2) Course developers and ISSs (available as necessary)
  - (3) Stakeholder reviewers from interested organizations
  - (4) Representatives/designees from the line of business
  - (5) Participants from the actual target audience, if possible, who will serve as students (or participants that are familiar with the target audience).
- c. Guidance: The estimated course delivery time plus an additional 10-15 percent to allow for comments and discussion after each lesson should be scheduled for the operational tryout. The number of participants should be identified so that a classroom of adequate



size can be reserved well in advance. Requirements for equipment or materials should be identified early so these can be arranged well in advance of the tryout. All course materials are provided at the time of the tryout in the same form used in an actual class.

- d. Feedback Forms: The developer should provide feedback forms that enable participants to react to the training after each lesson or training segment in terms of:
  - (1) Adequacy of the classroom
  - (2) Appropriateness of materials for the type of learning outcome
  - (3) Adequacy of materials for instruction on the subordinate skills
  - (4) Pacing of instruction
  - (5) Clarity and quality of both materials and instruction
  - (6) Readability of materials
  - (7) Relevance of materials to students' needs and interests
  - (8) Adequacy of the instructional content and activities, including lectures, questions, discussion, exercises, and tests.
- e. Results: Results of assessment activities are compiled and examined to determine if the course met stated goals for student achievement.
- f. Action: Following completion of the review, written documentation of the review is completed and provided to the developer. This documentation should include the name of the course, a list of the participants in the operational tryout, the date of the tryout, the number of students from the target population (if any), and how many of these met the stated goals for achievement (e.g., passed the tests), a consolidated list of changes to be made (both to the instructional materials and to the evaluation forms) prior to the first class conduct, and a scheduled date for the completion of the revisions.

The product of the review should also be a general go/no go decision that the course, given that the identified changes are made, is either ready to be presented to the first class or must undergo a follow-up review before proceeding with the first class conduct.

### 3.7.5 CONDUCT OF FIRST CLASS:

- a. Purpose: Following the operational tryout and completion of necessary revisions, the course is delivered in its final developmental form to the actual target population. The purpose is to verify that all previously identified revisions have been made and to establish that the course is effective when delivered to the target population.
- b. Participants: Participants include one or more instructors from the delivering organization and a representative sample of students

from the actual target population. (Course developers and ISSs may participate as observers).

- c. Guidance: The developers provide all instructional materials (e.g., lesson plans, student handouts, exercises, tests and test keys, equipment, etc.) necessary for delivering the course, unless otherwise instructed. The delivering organization identifies the number of students participating in the first class and ensures that any necessary enrollment activities are completed. As was the case with the operational tryout, arrangements for equipment, materials, and classrooms should be completed well in advance of the start of the class.
- d. Student Feedback Forms: To obtain input from the actual target population, the developer should provide feedback forms that enable participants to react to the training after each lesson and at the end of the entire course in terms of:
  - (1) Adequacy of the classroom
  - (2) Appropriateness of materials for the type of learning objective
  - (3) Instruction on the subordinate skills and whether sequenced logically
  - (4) Pacing of instruction
  - (5) Clarity and quality of both materials and instruction
  - (6) Readability of materials
  - (7) Relevance of materials to students' needs and interests
  - (8) Adequacy of the instructional content and activities including lectures, questions, discussion, exercises, and tests.
- e. Instructor Feedback Forms: The developer should also provide forms to enable instructors to assess the course according to the criteria mentioned above and in these additional areas:
  - (1) The time allocated for each lesson and the course
  - (2) The adequacy of logistics associated with course delivery
  - (3) The smooth flow of the course within and between lessons
  - (4) A final check of the previous corrections made
  - (5) The effectiveness and appropriateness of the instruction with the target audience.
- f. Results: Results of assessment activities should be compiled by the instructors and/or developers, and compared to stated goals for student achievement to determine if the course met these goals.
- g. Course Report: Following completion of the review, information should be compiled or completed by the instructors and/or developers for use in writing the course report (discussed in the next section).

#### 3.7.6 COURSE REPORT:

- a. Purpose: The course report is certification that the course has been successfully developed and is ready for regular delivery to students.
- b. Process: A course report should be prepared within 60 calendar days of the completion of the first class to summarize the results of the first class conduct. The organization that delivers the first course, with assistance from the developers as necessary, should write the course report. The course report is then submitted to the appropriate line of business.

Within 30 calendar days of receipt of the course report, the line of business should transmit a memorandum of acceptance or rejection of the training, with an explanation for the basis of a rejection, and guidance on any action to be taken. Both the course report and memorandum of acceptance are placed in the course file.

- c. Content: The following sections list the content that should be included in the course report.
- d. Course Data: The course data for the course report should include:
  - (1) Course number
  - (2) Course title
  - (3) Brief course description and list of training outcomes
  - (4) Criteria for passing the course
  - (5) List of lesson plans or training segments.
  - (6) Course duration
  - (7) Required prerequisites.
- e. Class Data: The class data for the course report includes:
  - (1) Class number
  - (2) Beginning and ending dates of the class
  - (3) Location of first class
  - (4) Course schedule of daily activities (or chart showing same)
  - (5) Number of students in class and class roster
  - (6) Number of students meeting the prerequisites
  - (7) Number of students who successfully completed the course and explanation for any Student who did not pass (e.g., failed comprehensive exam, withdrew from course, etc.).
- f. Test Data: The test data for the course report includes a list of tests administered by name/type (e.g., end-of-lesson, block, comprehensive, lab exercise, etc.), an indication of which tests are graded, which are non-graded, and for each test the:
  - (1) Number of students
  - (2) Mean score

- (3) Score range
- (4) Number of students failing to meet passing criteria.
- g. Comments: Comments should be included which summarize student and instructor comments and recommended revisions.
- h. Planned Revisions: The results of the first class should identify any planned revisions to be made. These would include:
  - (1) Media
  - (2) Method or instructional strategy
  - (3) Location
  - (4) Tests
  - (5) Class schedule or duration
  - (6) Course materials
  - (7) Numbers or types of instructors or instructor capabilities
  - (8) Facilities and equipment
  - (9) Cost impact of revisions (as appropriate).
- i. Supporting Documentation: Any necessary supporting documentation should be included and submitted with the course report, such as:
  - (1) Evaluation forms and/or checklists
  - (2) Results of test item analysis
  - (3) Other relevant information.
- j. Course File: The course report is included in the course file with other documentation.

### 3.8 COURSE EVALUATIONS

#### 3.8.1 COURSE EVALUATIONS:

- a. Purpose: This chapter explains the operation of the Division course evaluation system. It provides guidance on how to obtain and interpret course evaluation data, and how to use evaluation results to improve the quality of training.
- b. Public Law 104-50: Although this chapter provides guidance rather than policy, it should be noted that training evaluation is not an option of the training provider. Public Law 104-50 mandates the Evaluation of Training. (See JW-32 3330.2, Appendix F.)
- c. Evaluation in All Phases of ISD: As stated in Section 3.1.2.5, the evaluation phase of ISD is an interactive process applied throughout the entire ISD procedure. The preceding section discussed the validation process used during the development phase. This chapter focuses on course evaluations conducted during the delivery phase, after the course is fully developed and implemented.

d. Benefits: The benefits of an ongoing course evaluation process are:

- (1) Ensuring participants are learning the material
- (2) Ensuring training meets customer needs
- (3) Identifying course strengths and weaknesses
- (4) Providing a basis for course revisions/improvements
- (5) Measuring transfer of learning to workplace performance
- (6) Ensuring training is appropriate and cost effective
- (7) Ensuring training is tied to job duties.

### 3.8.2 LEVELS OF EVALUATION:

a. Assumptions: The Division course evaluation system is based on the following assumptions:

- (1) Training must be continuously evaluated
- (2) Evaluations must be based upon clear and consistent indicators of training quality
- (3) In-depth evaluations should occur when trend data show that quality indicators are below standard
- (4) Responsibility must be clearly assigned to monitor evaluation data and take appropriate action to improve the training.

b. Levels of Evaluation: The Division uses the Kirkpatrick model for training evaluation, which classifies evaluations of the effectiveness of training at the four levels below.

- (1) Level 1, Participant Reaction: This is the traditional level where, at the end of a course, participants are asked to rate their satisfaction with various aspects of the training and to provide any comments they may have concerning the course.
- (2) Level 2, Learning Outcomes: This level measures how well participants have mastered the course objectives, and is accomplished through written and performance exams administered during the course.

Note: Since this level of evaluation is conducted as a normal part of course delivery, it will not be discussed in this chapter.

- (3) Level 3, Transfer of Learning: This level determines the extent that the skills taught in training are used on the job, and whether job performance improved as a result of training. This usually occurs three to six months after training, when participants have had time to apply their new skills on the job.

- (4) Level 4, Training Value: This measures the extent the training produced benefits to the organization in terms of increased productivity, quality improvement, or cost benefit.
- c. Contents: The remainder of this chapter is divided into these sections:

- (1) End-of-course evaluation (Level 1)
- (2) Post-course evaluation (Level 3)
- (3) Training value (Level 4)
- (4) Use of evaluation data (all levels).

### 3.8.3 END-OF-COURSE EVALUATION:

- a. Purpose: End-of-course evaluation is a means of obtaining level 1 (participant reaction) evaluation data. It occurs at or near the completion of training to gather information on participant opinions and attitudes for modifying/improving the training. Public Law 104-50 requires end-of-course evaluation.
- b. Content: End-of-course evaluation data is usually obtained through questionnaires or oral debriefings with participants, or both. (When oral, participant feedback should be documented). At minimum, the evaluation should elicit participant reactions in the following areas:
  - (1) Course content (completeness, accuracy, timeliness)
  - (2) Organization and structure of the course
  - (3) Instructor effectiveness
  - (4) Perceptions of applicability/relevance
  - (5) Media/equipment used in course.
- c. Resident Training: All NFPO sponsored training courses will be supplied with an End-of-Course Questionnaires (EOCs) to be administered at or near the end of training. When completed, the instructors send the questionnaires to the Quality Oversight and Technical Advisory Team, to be evaluated. If course managers or instructors want to administer a supplemental page with course-specific questions, they are encouraged to do so.
  - (1) Questionnaire Administration: NFPO EOC questionnaires are delivered to course instructors approximately two weeks before the class end date. Instructors should distribute them to students at or near the close of training. Instructions for completing the questionnaires and returning them to the Quality Oversight and Technical Advisory Team for processing.
  - (2) Questionnaire Processing: After the EOC questionnaires are scanned into the evaluation system database, the Resource Management Staff notifies the course manager by cc:Mail that

the questionnaires have been processed. At that time, the evaluation data summary for that class can be accessed on PC. The questionnaire hard copies are then returned to the course manager.

- (3) Record Keeping: The course manager should keep the questionnaires in the course file. The questionnaires should be kept until they have outlived their usefulness for making adjustments to the course, or for a minimum of two years. They are the only record of student written comments and can be very useful in identifying trends and cross checking the data summaries.

#### 3.8.4 POST-COURSE EVALUATIONS:

- a. Purpose: Post-course evaluation is a means of obtaining level 3 (learning transfer) evaluation data. It occurs approximately three to six months after training, when course graduates have had time to apply their new skills to the job. The purpose is to determine the extent that skills taught are used on the job, and whether or not job performance improved as a result of training.
- b. Sources of Data: Post-course evaluation data is normally obtained from two sources--course graduates and their supervisors (or team leaders). Methods include:
  - (1) Questionnaires given to graduates and their supervisors
  - (2) Interviews with graduates and their supervisors at the job site
- c. Content: At minimum, post-course evaluations should answer the following questions:
  - (1) To what extent are graduates using the skills and behaviors they have been taught?
  - (2) To what extent has job performance improved as a result of training?
  - (3) Should anything be added to or deleted from the training?
  - (4) How can the course be revised to improve transfer of learning?
- d. Resident Training: All NFPO sponsored courses are included in a training evaluation system. Approximately four months after training, Division Post-Course Questionnaires are generated for all classes and given to course graduates and their supervisors. Returned evaluations are evaluated for needed changes to the course.

#### 3.8.5 THE USE OF TRAINING EVALUATION DATA:

- a. Problem Identification: The evaluation questionnaires discussed in this chapter do a good job of identifying when a problem exists within a course. They do not always, however, identify causes of

the problem. For example, consistently low ratings on the factor "relevance to job" indicate that many students think the training isn't relevant, but do not indicate why they think this, or what content areas are considered irrelevant. To ascertain this, course managers should collect additional evaluation data to pinpoint the exact nature of the problem and formulate strategies to solve it.

- b. Additional Data: When routine evaluations identify a problem within a course, additional data focusing on the identified problem should be collected. Sources of additional data include the following:

- (1) Analysis of student/supervisor written comments
- (2) Telephone interviews with former students, field supervisors
- (3) Observation of a class or classes
- (4) Comparison of job requirements with training provided
- (5) Reviewing validity of course documentation
- (6) Developing a customized questionnaire which focuses on the problem
- (7) Observing the environment at the work site
- (8) Observing performance on the job.

- c. Course Revision: The additional data collected should be analyzed and a response plan prepared. If the response does not involve changes in course length or course objectives, and does not involve additional resources, the course manager can immediately take action to revise the course as necessary. If there is a larger problem, or if the response involves length, objectives, or resources, the response must be a coordinated effort between the line of business and the training provider.

- d. Assistance: Upon request, the Quality Assurance and Technical Advisory Team will assist with evaluation planning and the development of evaluation instruments.

#### 4.0 DEFINITIONS

##### 4.1 WORD USAGE AND DEFINITIONS:

Word Usage. Unless otherwise noted, singular shall indicate plural, and vice versa.

- a. *Shall* is used when an application of a procedure is mandatory.
- b. *Shall not* means prohibited.
- c. *Should* means recommended.
- d. *May* means permitted.
- e. *Will* is used only to indicate futurity and is never used to indicate a requirement.
- f. Definitions.

- (1) Centralized Training: Agency training conducted at a location other than the participant's regularly assigned facility



(i.e., FAA Academy, Center for Management and Executive Leadership, Transportation Safety Institute (TSI) etc.). This may include resident courses conducted locally and funded centrally.

- (2) Certification Skill Check: An assessment made by the Procedure Team Managers to determine if a developmental demonstrates the knowledge and skill level necessary to be certified as a full performance level Procedure Development Specialist in accordance with FAA Order VN 3330.2 and this order.
- (3) Classroom Training: Instructional presentations administered away from normal day-to-day operational locations.
- (4) Computer Based Instruction (CBI): A method of delivering Instruction that uses interactive computer technology.
- (5) Correspondence Study: Program conducted primarily by self-paced lesson plans and/or E-learning.
- (6) Developmental: A NFPO specialist in any occupational series who has not achieved full performance level (FPL) for the position.
- (7) Developmental's Supervisor: The individual directly responsible for the developmental's job performance.
- (8) Full Performance Level (FPL): Status of a NFPO Specialist who has achieved the highest, non-supervisory, grade level, and is fully qualified.
- (9) Initial Qualification Training: Training conducted to initially provide the knowledge and skills required to become a Full Performance Level Specialist within the NFPO.
- (10) On-the-Job Familiarization: Time that a developmental spends participating in various orientation programs within AVN. These include, but are not limited to:
  - (a) AVN Orientation Program
  - (b) Flight Inspection Familiarization Program
  - (c) ISO Familiarization Training
  - (d) Computer Security Training
  - (e) Ethics Training
  - (f) Code of Conduct Training
  - (g) Security Readiness Training
  - (h) Sexual Harassment Training
- (11) On-the-Job Training (OJT): Training conducted by a Procedure Team Manager, Lead, or a designated OJT Trainer that provides direct experience in the work environment.
- (12) On-the-Job Trainer: An individual designated within each Branch who is responsible for developmental's instruction during OJT.
- (13) Out-of-Agency Training (OAT): Training conducted by or obtained from sources other than the FAA.

- (14) Proficiency: Knowing, understanding, and applying required job skills in a safe and efficient manner.
- (15) Proficiency Training: Training conducted to maintain and update the knowledge and skills necessary to apply job skills in a safe and efficient manner. A general term which incorporates Refresher, Supplemental, Remedial and Skill Enhancement Training.
- (16) Refresher Training: Recurring training conducted to maintain and update previously learned knowledge and skills.
- (17) Self-Study: A type of instruction where the student studies on their own initiative and is responsible for his /her own learning.
- (18) Skill Enhancement Training:
  - (a) Developmental: Training used to improve knowledge level or skill performance of developmental.
  - (b) FPL: Training designed to increase the proficiency of a specialist in a particular skill.
- (20) Supplemental Training: Training conducted when changes occur pertaining to new/revised criteria, procedures, regulations, or equipment.
- (21) Training Coordinator (TC): The individual designated by the Assistant Manager for Quality Oversight and Training to coordinate the NFPO Training and Certification Program with the Resources Management Staff.
- (22) Training Guide (TG): Guide that outlines required training for specific NFPO Occupational series. Some training guides have been incorporated as appendixes to this order.
- (23) Training Proposal: A written document that identifies a specific training need and specifies tasks, target audience, schedule, and priority for the proposed training.
- (24) Training Team: Designated individuals within a Branch who facilitate the training of a Developmental. Usually includes a Team Lead, the OJT Trainer, and the Developmental.